भारतीय मानक
Indian Standard

IS 579 : 2017

वनस्पति से शोधित तल्ले का चमड़ा — विशिष्टि

(चौथा पुनरीक्षण)

Vegetable Tanned Sole Leather — Specification

(Fourth Revision)

ICS 61.060

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

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Leather, Tanning Material and Allied Products Sectional Committee, CHD 17

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Leather, Tanning Material and Allied Products Sectional Committee has been approved by the Chemical Division Council.

Vegetable tanned sole leather is used in different types of footwear. Inspite of development of other alternate synthetic soling materials, which are being used by the industry in bulk, leather as soling material is still being used extensively in footwear specially for certain specific purposes.

The leather soles of footwear with poor water resistance wet the user's feet when he walks for a long time on a wet surface and make the footwear unusable. The vegetable tanned leather which absorbs water readily, loses its shape and wears out quickly. Indian sole leather is produced from buffalo hides, whereas continental sole leather is produced from ox hides. The texture of the fibres of buffalo hides is less compact than that of the ox hides. Because of the increasing use of synthetic soles which are more water resistant, the leather soles started becoming unpopular and therefore it became necessary, to produce water-resistant vegetable tanned soles.

This standard was first published in 1954 and subsequently revised in 1962, 1973 and 1996. During the second revision, the standard was issued in two parts, one for ordinary vegetable tanned sole leather and the other for water-resistant sole leather.

In third revision, the two parts were merged into one again, in light of the comments received from various users of sole leather and keeping in view the trend in the leather industry. The maximum value for total ash was increased in view of the feedback obtained from users like Ministry of Defence. An additional requirement of sulphated ash of water soluble was incorporated into the standard. Use of pentachlorophenol (PCP) was also prohibited in view of the directives issued by Government of India.

In this revision, the requirement of abrasion resistance has been incorporated, in view of the recent developments in the method of test for abrasion resistance. Further, the maximum value for the apparent density has been increased in view of comments received from users and research organizations. The requirement of 'resistance to cracking' has been replaced by "grain crack index". Additionally, requirement on restriction on hazardous chemicals has been introduced keeping in view the demand of eco-friendly inputs from the leather industry. The requirement of treatment of leather with fungicides has also been incorporated.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960, 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

VEGETABLE TANNED SOLE LEATHER — SPECIFICATION

(Fourth Revision)

1 SCOPE

1.1 This standard prescribes requirements and the methods of sampling and tests for vegetable tanned sole leather including those which have been specially treated for water-resistance property.

2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All the standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

IS No.	*Title*
582 : 1970	Methods of chemical testing of leather (*first revision*)
1640 : 2007	Glossary of terms relating to hides, skins and leathers (*first revision*)
5868 : 1983	Method of sampling of leather (*first revision*)
5914 : 1970	Methods of physical testing of leather
6191 : 1971	Methods of microbiological, colour fastness and microscopical tests for leather
14575 : 1999	Determination of pentachlorophenol (PCP) in leather — Method of test
14816 : 2000	Leather — Method of tests for Eco-criteria

3 TERMINOLOGY

For the purpose of this standard, the following definition shall apply.

3.1 Water-Resistant Leather — A leather is said to be water-resistant if the treatment given increases its resistance to absorption and passage of water through its thickness.

4 TYPES

Vegetable tanned sole leathers are classified into the following two types based on their water-resistant property:

Type 1 Vegetable tanned sole leather

Type 2 Vegetable tanned sole leather, water resistant

5 REQUIREMENTS

5.1 Raw Materials

The material used for Type 1 and Type 2 vegetable tanned sole leather shall be well preserved cattle hides free from serious grain and flesh defects.

5.2 Tanning

5.2.1 The hides for Type 1 and Type 2 sole leather shall be tanned with natural vegetable tanning material or their extracts or either of these in combination with or without syntans. The leather shall be fully tanned. A sharp cut made by knife shall show uniform tannage throughout its cross-section, when examined visually.

5.2.2 In order to impart water resistant property, the leather may be treated with suitable impregnating materials.

5.2.3 *Fungicidal Additives*

5.2.3.1 At the end of tanning operation and before drying, leather shall be treated with fungicides in requisite proportions.

NOTE — Extreme caution should be exercised since excess dosage of fungicides is harmful and often causes chafing, irritation or dermatitis. To arrive at the optimum dosage of effective and non-toxic fungicides, the method given in LB : 3 of IS 6191 may be followed.

5.2.3.2 Fungicides used to promote mildew resistance in leather shall be effective and non-toxic and shall be as agreed to between the purchaser and the supplier. Preservatives containing pentachlorophenol (PCP) shall not be used and the manufacturer shall give a declaration to this effect along with the consignment.

5.2.3.3 Sole leather shall also pass the fungicidal efficacy test, when tested in accordance with LB : 2 of IS 6191.

5.3 Finishing

The grain of both the types of sole leather shall be tight in the butt area and shall be well set out and rolled to make it smooth and even. The flesh side shall be smooth and clean. The material shall be trimmed.

5.4 Protection against Mildew

The material tested according to the method prescribed in LB : 2 of IS 6191 shall not show any growth of mildew.

5.5 Physical Requirements

Type 1 and Type 2 sole leather shall comply with the physical requirements given in Table 1.

5.6 Chemical Requirements

Type 1 and Type 2 sole leather shall also comply with the chemical requirements given in Table 2.

5.7 Hazardous Chemicals

The leather shall conform to the requirements given in Table 3, when tested in accordance with the methods prescribed in col 4 of Table 3.

6 PACKING AND MARKING

6.1 Packing

The leather pieces shall be packed as agreed to between the purchaser and the supplier.

6.2 Marking

6.2.1 Individual leather pieces shall be marked with its weight in kilograms and type; the packages shall be marked with total net weight in kilograms, type, number of pieces, name of the manufacturer, recognized trade-mark, if any, and month and year of manufacture.

6.2.2 Each leather at the tail end of the flesh side shall be marked with its area, in dm^2, and the type.

6.2.3 The packages shall be marked with the following information:

a) Name of the manufacturer and its recognized trade-mark, if any;
b) Name of the product and type of leather contains;
c) Number of pieces of leather;
d) Total area and mass; and
e) Month and year of manufacture

6.2.4 *BIS Certification Marking*

The product may be also marked with the Standard Mark

Table 1 Physical Requirements for Sole Leather

(*Clause* 5.5)

Sl No.	Characteristic	Requirement		Method of Test, (Ref to Cl No. of IS 5914)
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Apparent density, g/cc, *Max*	1.1	1.1	LP : 5
ii)	Water absorption, percent, *Max:*			
	a) in 30 min	45	10	LP : 12[1)]
	b) in 2 h	45	15	
	c) in 24 h	50	30	
iii)	Abrasion resistance, mm/kc, *Min*	3	3	Annex A
iv)	Grain crack index, *Min*	16	16	LP : 13

[1)] the value shall be expressed in terms of Q (*see* **6.1** of LP : 12 of IS 5914)

Table 2 Chemical Requirements for Sole Leather

(*Clause* 5.6)

Sl No.	Characteristic	Requirement		Method of Test, Ref to Cl No. of IS 582
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Total ash, percent by mass, *Max*	4.0	4.0	LC : 3
ii)	Solvent extractable substance, percent by mass, *Max*	6.0	15.0	LC : 4
iii)	Water soluble matter, percent by mass, M*ax*	21.0	15.0	LC : 6
iv)	*p*H of water solubles	Not below 3.5	Not below 3.5	LC : 18
v)	Differential number, *Max*	0.7	0.7	LC : 18
vi)	Degree of tannage, *Min*	58	58	LC : 21
vii)	Sulphated ash of water soluble, in percent, *Max*	2	2	LC : 7
viii)	Hide substance, percent by mass, *Min*	40	40	LC : 5

NOTE — Calculation of requirements for Sl No. (i), (ii), (iii), (vi), (vii) and (viii) shall be done on zero percent moisture basis.

Table 3 Restriction on Hazardous Chemicals

(*Clause* 5.7)

Sl. No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Formaldehyde, mg/kg, *Max*	150	LC : 3 of IS 14816
ii)	Pentachlorophenol, mg/kg, *Max*	5	IS 14575
iii)	Coupled amines released from azo-dyes (sum parameters), mg/kg, *Max*	30	LC : 4 of IS 14816

6.2.4.1 The use of standard Mark is governed by the provision of *Bureau of Indian standards Act,* 1986 and the rules and regulations made thereunder. The details of condition under which the licence for the use of standard mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING AND CRITERIA FOR CONFORMITY

For the purpose of ascertaining the conformity of the material to this specification, the scale of sampling and criteria for conformity shall be as prescribed in IS 5868.

ANNEX A

(*Table* 1)

TEST METHOD FOR ABRASION RESISTANCE

A-1 SCOPE

This method is intended to determine the abrasion resistance of a material. The method is mainly applicable to footwear sole leather but it can be used with any sheet material.

A-2 PRINCIPLE

The wearing surfaces of two square test specimens are placed in contact with a standard abradant. The test specimens are then moved backward and forward over the abradant under a constant contact force. To maintain the abrasive action during the test a suction system is used to remove dust as the abradant is gradually fed under the specimen. The average rate of reduction in thickness of each test specimen material per thousand cycles throughout most of its thickness, excluding approximately the last 0.5 mm, is then determined.

A-3 APPARATUS AND MATERIALS

A-3.1 An abrasion machine (*see* Fig. 1) with:

A-3.1.1 A flat rigid table of minimum length 210 mm and minimum width 30 mm.

A-3.1.2 A means of feeding a standard abrasive paper (*see* **A-3.2**) across the width of the table at a speed of 13.5 ± 1.0 mm/min. The abrasive paper must be guided or constrained so that it is not moved by the reciprocating action of the test specimens (*see* **A-3.1.4)**.

A-3.1.3 A carriage fitted with two square test specimen holders, each capable of holding a test specimen 25.5 ± 0.5 mm × 25.5 ± 0.5 mm, with their centres 100 ± 5 mm apart.

A-3.1.4 A method of moving the carriage (*see* **A-3.1.3**) with a simple harmonic reciprocating action of stroke 75 ± 2 mm and frequency 30 ± 5 cycles/min along the length of the table (*see* **A-3.1.1**) so that the two test specimen holders are always resting on the table.

A-3.1.5 A means of applying a force of 35.5 ± 0.5 N between each of the specimen holders on the carriage (*see* **A-3.1.3**) and the table (*see* **A-3.1.1**).

A-3.1.6 A vacuum suction system for removing dust particles from the surface of the abrasive paper (*see* **A-3.2**) during the test.

A-3.1.7 A method of counting the number of cycles traversed by the carriage.

A-3.2 A roll of resin bonded abrasive paper of minimum width 216 mm coated with silicon carbide of grit size 80X. This should fit snugly between the guides which constrain its movement under the forces applied by the specimens.

A-3.3 A system of mounting the test specimens consisting of:

A-3.3.1 Two square ferrous metal plates of similar thickness approximately 3 mm and sides of length greater than 25 mm but short enough to fit snugly into the specimen holders on the carriage (**A-3.1.3**). The centre of each plate should be marked on one of its surfaces. The other surface is bonded to the test specimen.

A-3.3.2 Adhesive, such as cyanoacrylate-based 'superglue', to attach the test specimens to the metal plates (*see* **A-3.3.1**).

A-3.4 A cutting device, such as a press knife, capable of cutting test specimens of the dimensions specified in section **A-4.2**.

A-3.5 A dial thickness gauge capable of measuring to the nearest 0.01 mm and which applies the appropriate standard conditions for the test specimen material. In the case of leather, the presser foot should be circular of diameter 10 ± 1 mm and apply a pressure of 49 ± 5 kPa.

A-4 PREPARATION OF TEST SPECIMENS

A-4.1 Store the uncut sheet material in a standard controlled environment 27 ± 2°C and 65 ± 5% RH for at least 48 h prior to testing and carry out the test in this atmosphere and record the atmospheric test conditions in the test report.

A-4.2 Use the cutting device (*see* **A-3.4**) to cut two square test specimens 25.5 ± 0.5 mm × 25.5 ± 0.5 mm. If information is required on overall abrasion resistance, cut the test specimens from randomly chosen positions on the sheet material. If information is required on local abrasion resistance, cut the test specimens from adjacent positions.

A-4.3 Mark 'I' on one edge of one test specimen and 'II' on one edge of the other specimen. 'I' represents test specimen 'a' and 'II' represents test specimen 'b'. These markings are chosen to remain apparent throughout the test as the specimens reduce in thickness, so that it is possible to differentiate between the specimens and ensure that they are always replaced in the machine in the correct orientation.

A-4.4 Use the dial thickness gauge (*see* **A-3.5**) to measure the thickness of the test specimens at their centers. Record the thicknesses as [Ta] and [Tb] to the nearest 0.01 mm.

A-4.5 Bond the test specimens to the metal plates (*see* **A-3.3.1**) as follow:

A-4.5.1 Clean the bonding surface of each metal plate with fine abrasive paper to remove remnants of adhesive and test material from previous tests. Apply the adhesive (*see* **A-3.3.2**) to this surface of each metal plate by carefully following the adhesive manufacturer's instructions and strictly complying with any recommended safety precautions.

A-4.5.2 Immediately bond the surface that is not to be abraded (the flesh surface for sole leather) of each test specimen to a metal plate prepared in **A-4.5.1**. Ensure that the edges of the test specimen and metal plate are aligned. This combination of test specimen and metal plate will subsequently be referred to as a test specimen assembly.

A-4.6 Use the dial thickness gauge (*see* **A-3.5**) to measure, to the nearest 0.01 mm, the thickness of each test specimen assembly at the centre of the test specimen. Record the thicknesses as [Sa] and [Sb].

A-4.7 Calculate the combined thickness of the metal plate and adhesive in each test specimen assembly as [Ma] and [Mb] as follows:

a) [Ma] = [Sa] – [Ta]

b) [Mb] = [Sb] – [Tb]

A-5 PROCEDURE

A-5.1 For each test specimen assembly, determine the target end point thickness by adding 0.5 mm to the values of [Ma] and [Mb] respectively.

A-5.2 Load the abrasion machine (*see* **A-3.1**) with a sufficient length of new abrasive paper (*see* **A-3.2**).

A-5.3 Place a test specimen assembly into each holder on the carriage (*see* **A-3.1.3**) so that the marked edge is towards the front of the machine.

A-5.4 Apply a force of 35.5 ± 0.5 N between each test specimen and the abrasive paper (*see* **A-3.2**).

A-5.5 Operate the abrasion machine (*see* **A-3.1**) until it has completed 50 cycles and then remove the test specimen assemblies from the machine. It may be convenient to use a magnet to remove the test specimen assemblies from their holders.

A-5.6 Using the dial thickness gauge (*see* **A-3.5**) measure at the centre of each test specimen and record the remaining thicknesses of the test specimen assemblies as [Ra] and [Rb] to the nearest 0.01 mm. Record the number of abrasion cycles corresponding to the thicknesses as [Ca] and [Cb].

A-5.7 Replace the test specimen assemblies in the machine in the same positions as before and with the marked edges towards the front. Repeat the abrasion procedure (*see* **A-5.4** to **A-5.6**) until the remaining thickness of the test specimen assemblies is just below

the target thickness established at **A-5.1**. If one test specimen assembly has reached the target thickness and the other has not, only continue to abrade the test specimen which has not reached its target thickness. If a test specimen has worn to a hole or is wholly or partially removed from the metal plate then use for the final readings the last measured thickness and corresponding number of cycles when that test specimen was still intact. The number of abrasion cycles between each thickness measurement should be judged by the thickness loss between previous measurements. Measures the thickness of the test specimens at intervals of 50 cycles or 100 cycles if the abrasion rate is low, reducing to about 20 cycles or fewer as the target end point thickness is approached.

A-5.8 Calculate the abrasion rate for each test specimen assembly using the following formulae:

$$\text{Abrasion rate for test specimen 'a', mm/kc} = \frac{[Sa] - [Ra] \times 1000}{(Ca)}$$

$$\text{Abrasion rate for test specimen 'b', mm/kc} = \frac{[Sb] - [Rb] \times 1000}{(Cb)}$$

where,

[Sa] and [Sb] = original thicknesses of each test specimen assembly as determined in **A-4.6**.

[Ra] and [Rb] = final values of thickness of test specimen assemblies as determined in **A-5.6**.

[Ca] and [Cb] = number of abrasion cycles corresponding to the thicknesses [Ra] and [Rb].

NOTE — Ca and Cb may be different.

A-5.9 Calculate the average abrasion rate as the arithmetic mean of two abrasion rates calculated in **A-5.8**.

A-5.10 Calculate for each test specimen the final remaining thickness of the test specimen material only as (Ra – Ma) and (Rb – Mb).

A-5.11 If a measure of the variation of the rate of abrasion throughout the abraded thickness of the test specimen material is required, for example for polyurethane, leather or other non-homogenous materials, present the results graphically as follows:

For each test specimen, plot [Sa] – [Ra] or [Sb] – [Rb] respectively as 'y' or the ordinate against the number of abrasion cycles, [Ca] or [Cb], as 'x' or the abscissa.

A-6 TEST REPORT

A-6.1 Reference to this test method.

A-6.2 A description of the material.

A-6.3 Atmospheric test conditions

A-6.4 The average abrasion rate, in mm/kc, as calculated in **A-5.9**.

A-6.5 Whether the test specimens were cut from adjacent or separated positions.

A-6.6 Any deviation from this standard test method.

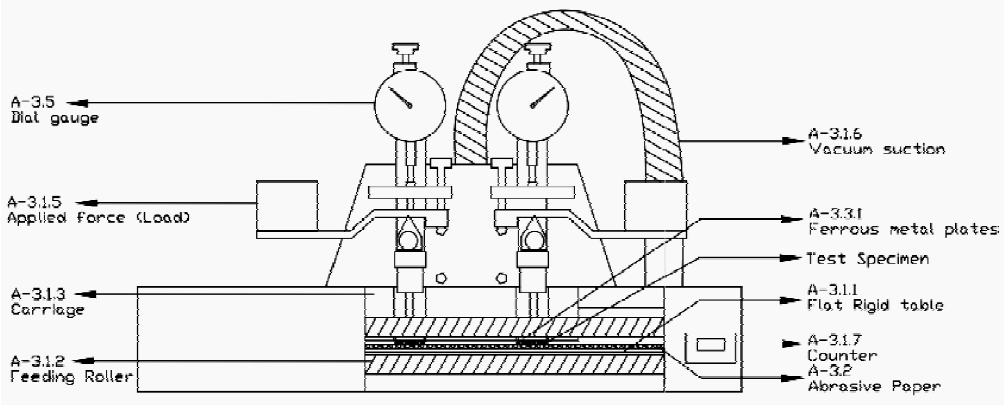

FIG. 1 ABRASION MACHINE

Bureau of Indian Standards

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 — 2323 7617, 2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi, KOLKATA 700054 — 2337 8499, 2337 8561, 2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 — 260 3843, 260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 — 2254 1216, 2254 1442, 2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400093 — 2832 9295, 2832 7858, 2832 7891, 2832 7892

Branches: AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. VISAKHAPATNAM.

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